

WHAT IS CLAIMED IS:

- 1 1. A method for creating a copy of data in a system comprising a
2 plurality of storage devices, a control unit operable to control said storage devices, at least
3 one of a plurality of processing units operable to access said control unit, and a buffer
4 memory operable to temporarily store data read from said storage devices within said
5 control unit, said storage devices addressable as at least one of a plurality of logical
6 volumes, including a first logical volume and a second logical volume, said method
7 comprising:
8 specifying a relationship between at least two of said logical volumes, said
9 relationship defined between said first logical volume and said second logical volume;
10 creating a copy of data in said specified first logical volume into said
11 second logical volume; said creating a copy further comprising:
12 copying data from said first logical volume to a first location in
13 said buffer memory;
14 copying said data from said first location in said buffer memory to
15 a second location in said buffer memory;
16 copying said data from said second location in said buffer memory
17 to said second logical volume;
18 wherein said copying said data from said first location in said buffer
19 memory to a second location in said buffer memory is performed by said control unit
20 substantially independently of said processing units.
- 1 2. The method of claim 1, wherein said copying said data from said
2 first location in said buffer memory to a second location in said buffer memory further
3 comprises:
4 reading data from said first location in said buffer memory into a buffer
5 location within an address change unit;
6 exchanging a logical address within said data from an address
7 corresponding to said first logical volume to an address corresponding to said second
8 logical volume; and
9 writing said data to said second location in said buffer memory.
- 1 3. The method of claim 1 further comprising: if a write request is
2 issued to said first logical volume after creating a copy has commenced,

3 creating a copy of data in said first logical volume to said secondary
4 logical volume before said data in said primary volume is modified by said write request.

1 4. The method of claim 1 wherein said relationship further comprises:
2 a pairing of a primary volume and a secondary volume.

1 5. The method of claim 1 further comprising: modifying a location
2 identifier defined in each logical volume.

1 6. The method of claim 1 further comprising: making said second
2 logical volume accessible after said creating a copy of data in said specified first logical
3 volume into said second logical volume.

1 7. The method of claim 1 further comprising: tracking modified data,
2 if a write request is issued to said first logical volume or said second logical volume after
3 the copy processing is completed, and
4 copying said modified data based upon said tracking, if creating a copy is
5 directed again to the pair in copy completed status.

1 8. The method of claim 1 further comprising: deleting said
2 relationship.

1 9. The method of claim 1 wherein said first logical volume is defined
2 as a primary logical volume, said method further comprising:
3 defining at least one of a plurality of different logical volumes as
4 secondary logical volumes; and
5 defining multiple pairs comprising said primary logical volume and one of
6 said plurality of second logical volumes.

1 10. The method of claim 9 wherein data in said secondary logical
2 volumes comprises a series of historical records of said primary volume, said historical
3 records obtained by switching said secondary logical volumes one after another.

1 11. The method of claim 1 further comprising: displaying information
2 about said first logical volume and said second logical volume.

1 12. A method for controlling the copying of information from a first
2 logical volume to a second logical volume in a computer system, said method comprising:
3 specifying a relationship between said first logical volume and said second
4 logical volume;
5 creating a copy of data in said first logical volume into said second logical
6 volume; said creating a copy further comprising:
7 copying data from said first logical volume to a first location into a
8 buffer memory;
9 copying said data from said first location in said buffer memory to
10 a second location in said buffer memory;
11 copying said data from said second location in said buffer memory
12 to said second logical volume;
13 wherein said copying said data from said first location in said buffer
14 memory to a second location in said buffer memory is performed by a control unit
15 substantially independently of a central processing unit.

1 13. A method for controlling the copying of information from a first
2 logical volume to a second logical volume in a computer system, said method comprising:
3 specifying a relationship between said first logical volume and said second
4 logical volume;
5 copying data read from said first logical volume into a buffer memory
6 located within a control unit and thereupon writing said data to said second logical
7 volume; and
8 wherein said copying said data from said first location in said buffer
9 memory to a second location in said buffer memory is performed by said control unit
10 substantially independently of a central processing unit.

1 14. A computer system comprising a plurality of storage devices, a
2 control unit operable to control said storage devices, at least one of a plurality of
3 processing units operable to access said control unit, and a buffer memory operable to
4 temporarily store data read from said storage devices within said control unit, said storage
5 devices addressable as at least one of a plurality of logical volumes, including a first
6 logical volume and a second logical volume, said control unit operatively disposed to:

7 establish a relationship between at least two of said logical volumes, said
8 relationship defined between said first logical volume and said second logical volume;
9 create a copy of data in said specified first logical volume into said second
10 logical volume; said creating a copy further comprising:
11 copy data from said first logical volume to a first location in said
12 buffer memory;
13 copy said data from said first location in said buffer memory to a
14 second location in said buffer memory;
15 copy said data from said second location in said buffer memory to
16 said second logical volume;
17 wherein said copy said data from said first location in said buffer memory
18 to a second location in said buffer memory is performed by said control unit substantially
19 independently of said processing units.

1 15. The computing system of claim 14 wherein said copy said data
2 from said first location in said buffer memory to a second location in said buffer memory
3 further comprises:
4 reading data from said first location in said buffer memory into a buffer
5 location within an address change unit;
6 exchanging a logical address within said data from an address
7 corresponding to said first logical volume to an address corresponding to said second
8 logical volume; and
9 writing said data to said second location in said buffer memory.

1 16. The computing system of claim 14 wherein said buffer further
2 comprises 10 Gigabytes of storage.

1 17. The computing system of claim 14 wherein said plurality of storage
2 devices further comprises a RAID.

1 18. The computing system of claim 14 further comprising a display,
2 said display operable to depict information about said storage devices.

1 19. The computing system of claim 14, wherein said control unit
2 further comprises a data recovery and reconstruct (DRR), said DRR operative to copy

3 said data from said first location in said buffer memory to a second location in said buffer
4 memory; and thereupon change a volume number associated with said data.

1 20. A computer program product for controlling the copying of
2 information from a first logical volume to a second logical volume in a computer system,
3 said computer program product comprising:

4 code for specifying a relationship between said first logical volume and
5 said second logical volume;

6 code for creating a copy of data in said first logical volume into said
7 second logical volume; said code for creating a copy further comprising:

8 code for copying data from said first logical volume to a first
9 location into a buffer memory;

10 code for copying said data from said first location in said buffer
11 memory to a second location in said buffer memory;

12 code for copying said data from said second location in said buffer
13 memory to said second logical volume;

14 wherein said copying said data from said first location in said buffer
15 memory to a second location in said buffer memory is performed by a control unit
16 substantially independently of a central processing unit; and

17 a computer readable storage medium for holding the codes.

1 21. A computer program product for controlling the copying of
2 information from a first logical volume to a second logical volume in a computer system,
3 said computer program product comprising:

4 code for specifying a relationship between said first logical volume and
5 said second logical volume;

6 code for copying data read from said first logical volume into a buffer
7 memory located within a control unit and thereupon writing said data to said second
8 logical volume; and

9 wherein said copying said data from said first location in said buffer
10 memory to a second location in said buffer memory is performed by said control unit
11 substantially independently of a central processing unit; and

12 a computer readable storage medium for holding the codes.

1 22. The computer program product of claim 21 further comprising:

2 code for displaying information about said first logical volume to a second
3 logical volume.

1 23. A control unit for controlling the copying of information, said
2 control unit operable in a computing system comprising at least one of a plurality of
3 storage devices, said control unit operable to control said storage devices, at least one of a
4 plurality of processing units operable to access said control unit, said storage devices
5 addressable as at least one of a plurality of logical volumes, including a first logical
6 volume and a second logical volume, said control unit comprising a buffer memory
7 operable to temporarily store data read from said storage devices within said control unit,
8 said control unit operatively disposed to:
9 copy data read from said first logical volume into a buffer memory located
10 within said control unit;
11 copy said data from said buffer memory to a different location within said
12 buffer memory, changing a volume identifier associated with said data, and thereupon
13 writing said data to said second logical volume; and
14 wherein said copying said data from said first location in said buffer
15 memory to a second location in said buffer memory is performed by said control unit
16 substantially independently of a central processing unit.

1 24. A computer system comprising a plurality of storage devices, said
2 storage devices addressable as at least one of a plurality of logical volumes, including a
3 first logical volume and a second logical volume, at least one of a plurality of processing
4 units, a cache memory operable to temporarily store data, and a control unit operable to
5 store and retrieve data from said storage devices on behalf of said processing units;
6 wherein said control unit is further operable to copy data from a first logical
7 volume to a second logical volume according to a relationship established between said
8 first logical volume and said second logical volume; wherein said control unit copies said
9 data from said first logical volume to a first location in said cache memory; whereupon a
10 data recovery unit within said control unit is operable to create a copy of said data in said
11 first location in said cache memory to a buffer location within said data recovery unit, and
12 thereupon to copy said data from said buffer location within said data recovery unit into a
13 second location in said cache memory; and thereupon to copy said data from said second
14 location in said cache memory to said second logical volume;

15 wherein said data comprises a logical address section, said logical address
16 section having a data content that is changed during said copying between said cache
17 memory and said buffer memory.

1 25. A computer system comprising:
2 a first means for storing data;
3 a second means for storing data;
4 a cache means for temporarily storing data;
5 a data recovery and reconstruction means for creating a copy of data from
6 said first means for storing data into said cache means, and thereupon to create a copy of
7 said data in said cache means into said second means for storing data,
8 wherein said data comprises a logical address section, said logical address
9 section having a data content that is changed by said data recovery and reconstruction
10 means from a physical address corresponding to said first means for storing data to a
11 physical address corresponding to said second means for storing data.